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It is with sincere regret and a sense of a great loss to Phi Delta Kappa and a personal loss to all who knew him that we announce the death of Willard N. Van Slyck of Topeka, Kansas, on January 16. His leadership as District Representative in District Three has been outstanding and contributions to Phi Delta Kappa in National Councils, National Committees, and District Conferences have been constructive and always helpful.

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Junior College Graduates

By E. H. McCUNE

THIS STUDY was undertaken as a part of a larger socio-economic study of junior-college students in the municipal junior colleges in Oklahoma. In the first part of the study an attempt was made to analyze the economic and social background of students attending the municipal junior colleges of Oklahoma. The second part of the study pointed out that certain definite, preparatory, curricular patterns leading to work in the four-year institutions were being followed in practically all of the colleges. Continuing in this follow-up study of junior college graduates it is proposed: (1) to inquire into whether they continue their education beyond junior college, and, if so, where and with what success, and (2) to investigate their occupational careers in an endeavor to relate their educational training to their life experiences.

In obtaining the data for this study the names and addresses of graduates over a period from 1932 to 1940, inclusive, were obtained from ten fairly representative municipal junior colleges in Oklahoma. The colleges from which the information was obtained were selected on the basis of size, location, curricular offerings, and interests so as to give as fair a sampling as possible of the eighteen colleges under consideration.

A personal letter, along with the inventory, was mailed to 950 students. From the number of inventories mailed, 506 or 53.7 per cent, were returned. The 506 responses represented approximately 42 per cent of the students graduated from all the colleges over the eight-year period studied.

It was found that a comparatively small number had been enrolled in semiprofessional courses, while approximately 95 per cent had been enrolled in curricula that necessitated continuance at a higher institution for their completion. It is evident that this wide difference in enrollments for the two- and four-year curricula was due, for the most part, to the emphasis placed on the latter type of curriculum. It would be misleading, however, to say that a lack of interest in semiprofessional courses existed on the part of the personnel of junior colleges. At no college was there found a self-satisfied group of instructors. On the contrary there were superintendents, deans, and instructors who were eager for what they termed "a more balanced curriculum," a curriculum in which the two-year as well as the four-year students would receive ample returns for their efforts.

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"Do students actually fulfill their original intentions by continuing in higher institutions the work they started in the junior college?" This question was answered by the students who participated in the study. The replies indicated that 67.6 per cent of the students actually continued their studies in institutions of higher learning. Approximately 3 per cent entered shorter courses in business colleges, or in schools of art, music, nursing, or other schools, but nearly one-third of the students, or 32.4 per cent, had not attended any higher institution. This would seem to imply that situations had arisen which made the accomplishments of earlier expressed interests of students inadvisable or impossible. Furthermore, it is shown that, although ample time had elapsed for the completion of the last two years of the four-year course, only 20.3 per cent of the junior college graduates received degrees from the four-year institutions.

Of the 342 replies concerning the number of academic hours completed beyond the junior college, the tabulation shows that slightly more than 47 per cent of the group had completed less than 20 semester hours of senior college credit. Approximately two-thirds of the students in this study graduating from the junior colleges continued in some standard four-year college or university. Such a high percentage of graduates would seem to justify a continuing emphasis upon the preparatory function for a certain group of students.

The influence of the University of Oklahoma was shown by the fact that 23.2 per cent of those reporting had attended that institution. Oklahoma A. and M. College came second with 14.6 per cent. Although a preponderance of citations to the teaching profession as a preference was evident, it was interesting to note that only 12.2 per cent of the prospective teachers elected to attend one of the six colleges of the State organized for the purpose of training teachers. The explanation is probably to be found in the convenience of the State University and the A. and M. College to the cities in which junior colleges are located. In addition, the fact might be added also, that the municipal junior colleges are organized and

inspected by a board of examiners made up from the two larger institutions of the State. That only about 3 per cent of the junior-college graduates enter shorter courses, such as those in business colleges, nursing, music, art, and other special schools, leaves little room to doubt the intentions of the majority of those who were graduated from the junior colleges.

If the municipal junior colleges of Oklahoma continue to pattern their courses after those offered in the first two years of the University and the A. and M. College, they will be serving the needs of a little more than one-third of those students who persist in their education.

The fact that 32.4 per cent reported that they had entered no higher institution since graduation from the junior college, and then another 47 per cent reported that they had completed only a few senior-college hours, presents to the junior-college administrators of the State a problem that merits serious consideration.

College officials find students entering junior college who are either uninterested in or unqualified for the courses offered. These students were awarded diplomas from high schools and passed on to the next level with a feeling of satisfaction, based on certain past accomplishments. Failure to achieve the goal on the new level has a tendency to demoralize the student, and soon he finds himself wondering whether he will be able to make the proper adjustment to his new environment. No law in Oklahoma requires that all high-school graduates be accepted by the junior colleges, but the custom is so well established, and the desire for the extra tuition is so pressing, that it is indeed rare for students to be rejected. The present study indicates that a careful analysis of the abilities of the applicants for admission, coupled with an efficient advisory system, would save many students from disappointment and failure. The municipal junior colleges of Oklahoma may have been justified in the past in emphasizing the college-preparatory function, but they have failed to make provision for terminal courses for the students who will remain in college for not over two years.

According to earlier findings in this study, approximately 70 per cent of the students who entered junior college withdrew for one reason or another before graduation. Out of the remaining 30 per cent who were graduated from the junior college, only a little more than two-thirds, 67 per cent, entered a higher institution. From the student responses concerning graduation, we may conclude that of those entering higher institutions, only 34 per cent completed the four-year course and received the bachelor's degree. Stated in terms of students, one may say that out of every 100 students who entered junior college, 30 graduated and entered a four-year institution. Of the 30 who entered the four-year college or university, 10 students graduated and received the bachelor's degree. The interest and welfare of the more than 70 per cent of students enrolled are of sufficient importance to justify serious study and consideration. It does not follow that all students would enroll in semiprofessional courses if they were offered; neither is it intended to imply from the foregoing statement that they should do so. There is not sufficient evidence in this study to warrant such an assertion. Other findings, in this study, concerning fields of specialization, occupational careers, and life adjustments, tend to corroborate the statement that the interests of a considerable number of students might best be served through semiprofessional courses. Such courses, it would seem, would tend to direct a considerable proportion of the students into specific fields in which they would have greater possibilities for success.

As a part of the present investigation, students were asked to record their field of specialization since leaving junior college. The summary of replies yielded some very interesting data. Teaching ranked highest with 160 students, which was 31.6 per cent of the total reporting; the group headed as "Other Fields" listed 82 or 16.2 per cent; clerical and secretarial, 70 or 13.8 per cent; professional (law, medicine, etc.) 51, or 10 per cent; business, 36, or 7.2 per cent; mechanical 35, or 6.9 per cent. Strangely enough only 9 students, or 1.8 per cent, included any phase of agriculture in their field of specialization, although they were living in a state in which the junior-college areas are predominantly agricultural. Omitting the professional and engineering fields from the list, which included approximately 47.8 per cent of the total, it is easily conceivable that one-half of the graduates pursued fields of specialization on a semiprofessional level. Under a different type of organization and with more effective guidance, could not these fields of specialization have been realized at the completion of work on the junior-college level?

The study revealed that only 40.1 per cent of the graduates favored the junior college as a preparatory institution, while 29.9 per cent believed that it should train for a specific vocation. Another 30 per cent believed that the municipal junior colleges of Oklahoma should train students for both preparatory and specific work. Perhaps the latter group is more nearly correct, for while there seems to be a greater need for the semiprofessional type of education for the students under consideration in this study, the present findings would not justify the elimination of the preparatory function altogether. On the contrary, the present findings would justify a continuation of the preparatory curriculum for a minority group.

In this connection it seemed advisable to go one step farther and ascertain, if possible, the ways in which junior-college training helped the graduate in work or in later study.

In view of the foregoing considerations, the following percentages are quite illuminating. First, only 32.8 per cent of the graduates mentioned "college preparatory" as being helpful in their work or in their later study, yet 40.1 per cent believed that the purpose of the junior college was primarily college preparatory. In the second place, social contacts and adjustments were mentioned by 20.3 per cent of the graduates as contributing most to their later work or study. It was somewhat surprising to find from the study that 19.2 per cent said they received no help worthy of mention from their junior-college experience. The report from this last group of students posits an implication which should challenge one to make further investigation and give more serious consideration to that large body of enrollees who entered the junior colleges of the State, and who withdrew, dissatisfied and discouraged, because they found no challenge to do the things they wanted to do. This, no doubt, includes a large number of the two-thirds who entered and withdrew before completing the two-year college course. Until the municipal junior colleges of Oklahoma undergo a reorganization based upon a wider variety of curricular offerings and an effective advisory system, the unsatisfactory features will continue to exist.

Students were asked the question: "What features of your junior college have proved of most value to you?" One-half of the replies mentioned subject matter. This citation was to be expected, since at least that number later attended a four-year institution. The small percentage listing guidance also corroborates earlier findings in the study. It is interesting and encouraging to know that the graduates attached little importance to the monetary value of obtaining an education. Only 4 per cent mentioned the difference in cost between the local junior college and a four-year institution as having significant value. The phrase, social activities, used on the question form was taken to mean such things as social adjustment, social contact, and other social experiences. It was enlightening to discover that 35.1 per cent of the graduates attached first importance to this area of junior-college experience. One would infer from this and other facts revealed in the study that the social-activities program for the municipal junior colleges of Oklahoma was at least average for such colleges.

One of the queries in the inventory called for the listing of the last occupation which the student had followed since leaving junior college, giving the date of employment, the nature of work, and the name of employer.

Significant is the fact that 72.4 per cent of the junior college graduates' replies listed occupations of the semiprofessional level, and only 27.6 per cent of the senior-college level, as in the case of teaching and other professions. The compilation disclosed 39 different occupations, and these were telescoped into six groups.

Special interest also focuses upon commercial work, about the only field that could be listed as terminal for the municipal junior colleges of Oklahoma, which claimed approximately one-fourth of the occupational choices of the students. Some of these students did take work beyond the junior college, for which due consideration should be given.

In view of the high percentage of college graduates working on the junior-college level, does it not seem logical that a larger number of courses of a semiprofessional nature should be offered?

The opportunities for women in vocations were found to be more limited than they were for men. It was not surprising to find that a large per cent of women were engaged in teaching. Those occupying positions in offices as secretaries, stenographers, or clerks comprised the next largest group of women. Library work provided an opportunity for a number of women while newspaper reporting attracted a smaller group.

The men distributed themselves among 23 general classifications of occupations. The largest group comprised the unskilled and semi-skilled laborers, the second, the professional group—doctors, lawyers, engineers; the third group consisted of those engaged in some type of commercial work; the fourth group were artisans. Outside the professional group, which accounted for 25 per cent of the men graduates, it is true, perhaps, that the other 75 per cent could have received ample training for their occupational choices in a well-organized junior college. By a liberal interpretation of the requirements of the occupations listed, the 190 men, constituting 75 per cent of the total men graduates under consideration, were doing work that does not require senior-college training. This situation implies that the junior college might have done better by its students had the school provided more opportunities of a semi-professional nature.

The foregoing assemblage of data make it clear that a large number of junior-college students do not continue their college attendance beyond the two-year level; that many who do enter higher institutions discontinue their efforts before graduation; and that a very large percentage of the entire group were engaged in occupations which did not require four years of college preparation.

Moreover, the follow-up study clearly indicates the

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The Role of Mathematics in Postwar Education

By JAMES H. ZANT

I. In Secondary Education

DURING recent months the war and industries created and made more vital by the war have emphasized the values and uses of mathematics. The subject has moved overnight from a position where it was grudgingly admitted to be useful to a few technically and scientifically interested students to a position where it is considered vital to almost all the students who go to the secondary schools. Students going into the armed forces are urged and often required to obtain a knowledge of algebra, geometry, and trigonometry. Girls who may be expecting to work in various industries are expected and urged to have some knowledge of secondary mathematics.

This popularity of mathematics may well prove to be temporary. Much depends on the way the teachers of mathematics meet the situations now and in the future. The fact that mathematical training is considered necessary by the armed forces does not necessarily mean that the training we have been giving the secondary student is the best even for the military service, much less for the future peacetime needs. It may only mean that it is considered better than other types of training which are available for the student.

However, the war has created, or at least accelerated, the need for new types of mathematics. Many of these needs will continue to be prominent after peace has been established. Flight problems which involve a knowledge of algebra and geometry and, in some cases, considerable trigonometry must be familiar to the coming generation who will be flying the planes of that age. Needs of mathematics in commercial and industrial problems have increased with the new businesses and industries which have been created by the war. The secondary school should remember that the armed forces, industry, and commerce have, in many cases, been forced to retrain the young people in certain mathematical knowledge which was not learned in high school. Something should be done to see that the student of the future gets the training he will need for the work he will have to do. Only in this way can mathematics hold its position in the esteem of the public which it has been accorded during these last months.

Hence, let us look at the probable needs of mathematics for our future citizens. These citizens might be divided into at least three classes as regards their mathematical needs. First, technically trained men and women. These would include, of course, the engineer and any one who does much work in the physical sciences. It would also include a growing list of applied technicians like the actuary, the expert accountant, the statistician, and the like. These are all highly trained thinkers and their need and use of mathematics is unquestioned. They must have exceptional training in this field. Their mathematical needs have been well thought out and standardized. Few people question these standards. If the secondary school can segregate these students early, their mathematical training in the high school should be thorough and continued over the full four years. It is so basic for their future training that there is no danger of getting too much at that level.

Second, a middle group of trained workers and thinkers on a somewhat lower level than those mentioned above will be expected to be able to use certain mathematical skills in doing the work of the new world. They will be the skilled workers both in industry and in business. They will be expected to use mathematical skills and knowledge as a tool, but not to do the original thinking of the engineer and the highly trained applied mathematician. These people will need considerable training in mathematics, but not as much or of the same kind as group one discussed above. It should fit them to do things that will need to be done in the new jobs, many of which have been begun in war programs, but which will be continued into peace times. This cannot be accomplished by merely teaching the first few courses necessary for the future engineer and applied mathematician. That is one of the reasons for the necessity of the vast retraining programs which have been carried on for war industries. Needs must be studied and curricula built accordingly.

Third, many people may not go into the type of

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jobs which will require special knowledge and skills in mathematics. Mathematical needs for these people will be limited to the things required for them to live a rich, well-rounded life. This subject matter is largely included in what is sometimes called the *Mathematics of Business*. It does not mean the mathematics of business which will be needed by the semiprofessional worker in the offices and industries of the country, but the mathematics of business which every one will need in daily life. This will include, in addition to the fundamental skills with whole numbers, fractions, and decimals, the mathematics of installment buying and finance companies, budgets, insurance, taxes, revenue, state expenditures, school costs, other phases of public finance, and many others. In other words, mathematics applied to the things with which everyone, regardless of his business or profession, will have to deal. Everyone in the secondary school will need this sort of training. These skills and habits of quantitative thinking will be of inestimable value to them in their later lives as citizens, home makers, home owners, investors, and consumers.

Hence, the task of the secondary schools regarding mathematics should be two-fold. Every student needs the mathematics of citizenship, some will be trained as professional and semiprofessional workers. We should not make the mistake, however, of putting the citizenship training so early in the student's life that it has no reality to him. As a matter of fact much of this material is now included in some form in junior high school mathematics. It is difficult to make it functional at this level since the time of using it is so remote. Probably the junior or senior years of the high school would be a better time. There would then be no necessity of making the course easy or simple since the students would have enough maturity and background to learn the subject matter thoroughly.

The mathematical training for professional and semiprofessional workers can be made quite definite. The main trouble will be that many students will not be able to decide what they want to do so early. Probably they should not decide that early. These students will certainly need a year of algebra, probably a year of geometry, and if they expect to enter a professional field like engineering, they should continue the study of mathematics in the secondary school to include solid geometry, advanced algebra and as much more as time permits. The course described as the *Mathematics of Business* could come near the end of the high school period for them also.

This may be too much mathematics for the small high school to offer. However, it will be almost necessary to offer the algebra and geometry if any of the students expect to go to college. The course in the *Mathematics of Business* should not be left out, since students from small high schools will also have to live in the modern world. If the more advanced courses must be omitted, then these students will enter college or other training institutions with that much of a handicap. It is usually necessary to make up these deficiences before the regular professional work can be started.

Such an arrangement should be satisfactory to all concerned. The prospective college student could get enough work in mathematics so that he would not be penalized if he entered a professional curriculum. He and the students who were not preparing to enter college would get some training in the mathematics they will use in everyday life and this would come late enough for the student to understand its significance and importance.

One of the most dangerous things for the mathematics teachers of these times is to assume that nothing should be done about the mathematics offering. This sort of an attitude may well lead to a return of the antagonistic feelings toward any mathematics in high school. We must be willing to revise our offering to meet any special demands which the postwar world may make. We must be able to teach a mathematics that actually functions in the future jobs of the students. The teaching itself must be improved. If education in the secondary schools for special jobs actually materializes after the war, we must be able to adapt the subject matter of mathematics to the actual needs of the students regardless of what happens to our standard courses. If we can make these adjustments to the needs of the future, there is no reason to fear that mathematics will not be able to retain the high respect which it has won during this period of our national emergency.

II. Implications of War Training Programs for College Mathematics

Most of the larger state institutions and many of the smaller colleges have had some experience with the various war training programs during the last two years. These programs call for a wide range of subject matter teaching. Some of them ask for a purely clerical or a purely skilled mechanical training, but several of the programs call for an advanced type of academic training in several fields, including mathematics. Our own college has three of these programs which involve varying amounts of mathematics. These are the U. S. Naval Training School (E. E. and R. M.), The 90th Army Air Force College Training Detachment (Air Crew), and Unit 3872 of the Army Specialized Training Program. These few brief remarks will be based on experience in teaching and supervising the mathematics required in these programs.

The courses organized by the Army and Navy for

these men in mathematics, as well as other subjects, seem to be based on some such set of assumptions as the following:

1. These students need certain skills and knowledge of mathematics for their future jobs. Those things, and those only, are to be taught.
2. No weight is to be given to traditional courses in mathematics unless a definite need can be demonstrated.
3. Meanings and other cultural material are to be omitted unless their value can be demonstrated.
4. Material above the bare essentials is to be left out, even though the exceptional service man might be able to use it in jobs which are more difficult than the ordinary.

These assumptions, often unexpressed, should be carefully scrutinized by the mathematics teacher, especially when the present emergency is over and we begin to reorganize our work. We cannot afford to assume that we can go back to where we left off when the war started. We will undoubtedly face new conditions and the forces set in motion by the various Army and Navy schools are going to affect our future development. It seems, then, that some of the implications of these programs and our experience with them are:

1. We cannot expect to revert to the college as it was before the war.
2. We will have to teach students better than we have in the past. This will apply particularly to the public schools where the fundamentals were supposed to be learned. However, the secondary schools and colleges cannot ignore the responsibility of perfecting these skills and adding more complicated skills and further knowledge about the things that the students will have to do.
3. We must not only teach better, but we must reorganize our courses so that they will be really functional. Mathematics must become an applied subject. One reason why our men in the Army know so little about the mathematics they have studied is that they did not realize its value or see where it could be used for any practical purpose.
4. It seems highly probable that we may have to shorten our courses in mathematics to include only that which the student will need in his future job. It is even possible that skills without meanings may be demanded. This is being done now in some of our war training programs. Mathematics must adapt itself to the demands of the times, if it is to be of most service.

This list of implications might be extended, but these will serve to give some idea as to what may be in store for us. It does not mean that the outlook for mathematics is dark. On the other hand the subject can look forward to a healthful future. But its maximum service will depend on how it meets the changing conditions which are almost surely in store for us. If we can look at each new situation which presents itself with unprejudiced eyes, and if we are determined to serve the students to the best of our ability, there is no reason why mathematics should not continue to be, as it has been in the past, the greatest single function in the progress of our civilization.

Junior College Graduates

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inadequacy of guidance in the municipal junior-college program of the state. The data gathered in this study yield much information concerning the variety of personal problems. These problems may be classified as financial, academic, health, emotional, moral, ethical, and social. None of the colleges revealed an adequate system of guidance in any of these classifications. The response of graduates, now facing the realities of life for which they were at least partially prepared in the junior college, are highly sympathetic toward a college counsellor for those who follow them.

Some Implications for Administrators

It is evident from the large annual turnover, as well as the inability to hold students, that the junior colleges of Oklahoma are not meeting adequately the needs of the youth who attend them. In the main it would seem that the educational opportunities are too limited. Public support has not been won for the idea that these youth should have more opportunities of the vocational kind. We in education in Oklahoma have been too slow in discovering the actual vocational, social, and physical needs of youth and in providing the best educational facilities for meeting such needs.

There is also a strong implication in the graduates' responses to the effect that those who drop out of college after a year or two in attendance have not been benefited as they should by their college work. Most of the courses in the lower division are foundation courses for the upper-division work, and these students who claim a minimum benefit never attain upper-division standing.

The fact that 73 per cent of the graduates of junior colleges listed their present occupations on a semi-professional level leads to the vigorous assertion that the municipal junior colleges in Oklahoma must go farther than they have in making provision for terminal courses of the junior college level. Whatever may be said in favor of making cultural training, as such, available, the vocational aspects of training cannot be overlooked.

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